UNMANNED AERIAL VEHICLE TACTICAL CONTROL SYSTEM (UAV TCS)

Program Management Plan

Program Executive Office
Cruise Missiles & Joint
Unmanned Aerial Vehicles

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JOINT PROGRAM OFFICE

PROGRAM EXECUTIVE OFFICE FOR CRUISE MISSILES
AND JOINT UNMANNED AERIAL VEHICLES
1213 Jefferson Davis Highway
Arlington, VA 22246

UNMANNED AERIAL VEHICLE
TACTICAL CONTROL SYSTEM
(UAV TCS)

PROGRAM MANAGEMENT PLAN

Executive Summary

PROGRAM DESCRIPTION: This Project Management Plan addresses the administration of the Unmanned Aerial Vehicle Tactical Control System (UAV TCS) project within the Program Executive Office for Cruise Missiles and Joint Unmanned Aerial Vehicles.

The Tactical Control System (TCS) is an Office of Secretary of Defense (OSD) initiative to provide joint warfighting commanders with interoperable and scalable command, control, communications, and data dissemination systems of the family of present and future Medium Altitude Endurance (MAE) and tactical UAVs. TCS will receive and disseminate data for the High Altitude Endurance (HAE) UAVs. The Defense Airborne Reconnaissance Office (DARO) and Joint Project Office (JPO) are developing TCS with open specifications for interfaces, services, and supporting formats, consistent with the Open System Deployment Plan (OSDP). TCS will employ current common hardware and software. The TCS architecture will be open and modular to support UAV operations from a variety of computer systems. TCS will allow the simultaneous control of multiple UAVs and their payloads from the same control system. The TCS open system architecture is necessary to support TCS reconfigurability for UAV missions to the joint services at multiple echelons.

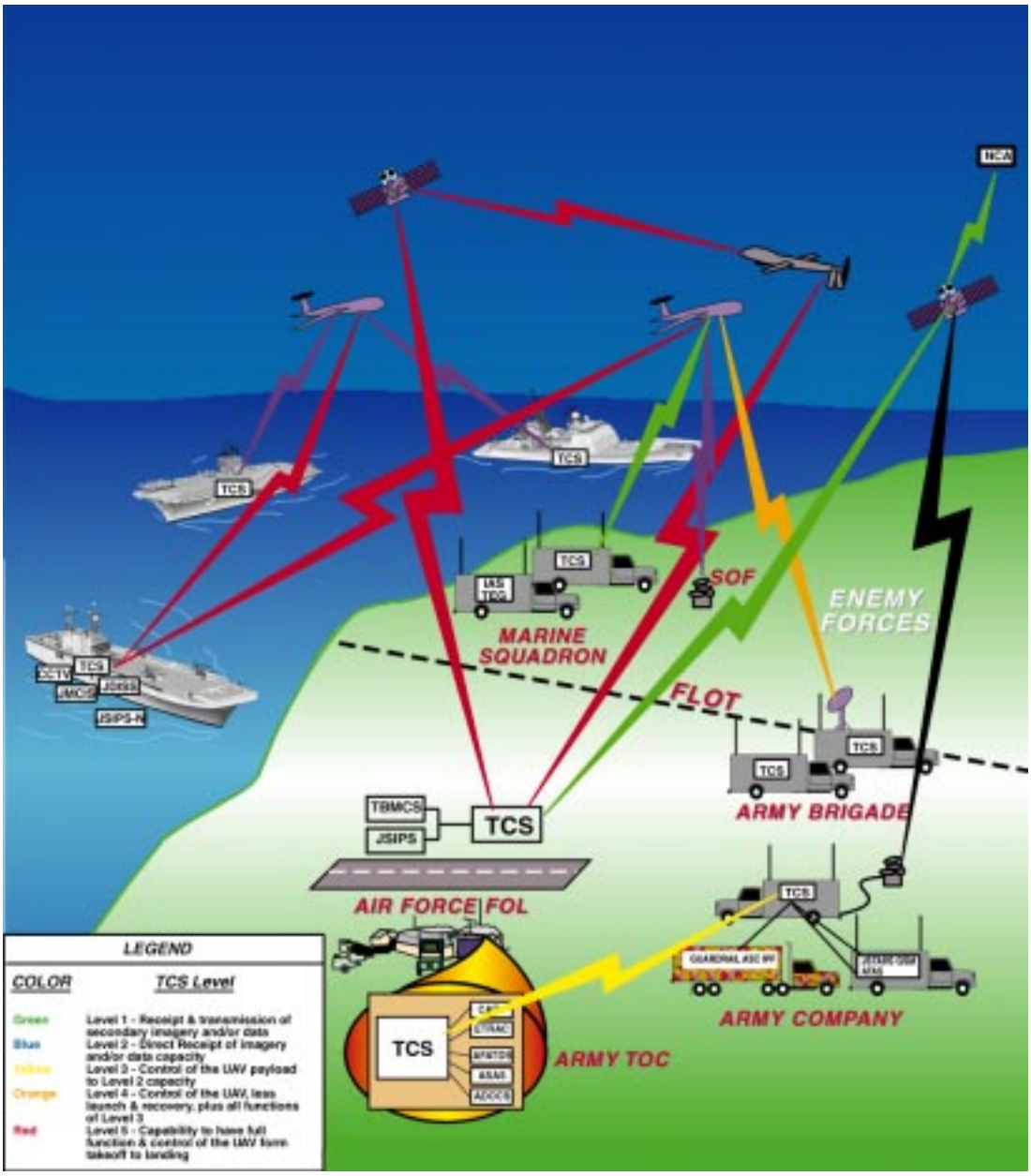
The system will follow these key characteristics:

- Definition of systems interfaces to facilitate new or additional systems capabilities.
- Explicit provisions for expansion or upgrade through the incorporation of additional or higher performance elements.
- Accommodate new, underpinning technologies, with minimal impact on the system and interoperability.
- Use of standards which are developed/adopted by industrially recognized standards bodies.
- Well defined widely used, and non-proprietary interfaces/ protocols.

TCS is currently in Acquisition Phase I and will be accomplished in three phases.

Phase I	Program Definition and Risk Reduction,
Phase II	Engineering and Manufacturing Development (includes Low Rate Initial Production (LRIP)),
Phase III	Production, Deployment and Operational Support

Tactical Control System



AUTHORIZATION/APPROVAL:

_____ _____

CAPT A. RUTHERFORD, USN (PM-TCS) Date
Program Manager - Tactical Control System

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PROGRAM MANAGEMENT PLAN

INTRODUCTION

Purpose

The purpose of the UAV TCS Project Management Plan is to provide a single document which compiles pertinent information necessary for day-to-day project management of the UAV TCS project. Additionally, this plan provides a basic overview of the UAV TCS program acquisition strategy and fielding plan.

Background

The Office of Secretary of Defense (OSD) established an initiative to provide Joint warfighting commanders with interoperable and scalable command, control, communications, and data dissemination systems for the family of present and future MAE and tactical Unmanned Aerial Vehicles (UAVs). In response to this initiative the Program Executive Office for Cruise Missiles and Joint UAVs (PEO(CU)) has established a UAV Tactical Control System (TCS) acquisition program with a three (3) phase development schedule. Procurement of the TCS is an urgent requirement based on the need to provide UAV systems to operators supporting current military operations.

Use of information from the Predator, currently deployed in Bosnia, has been limited to the single ground control system built specifically for the Predator. This design is consistent with previous UAV programs. The TCS is being developed to eliminate the current approach of a unique control system for each different UAV. The TCS approach will reduce duplication of efforts and provide a significant reduction of development and operating costs. When deployed, the TCS will be interoperable with all UAVs, including the Predator (currently deployed) and the Outrider (currently under design and development) and will be capable of dissemination of critical data for planning, targeting, and combat assessment to support Joint services at multiple echelons.

The TCS program supports the warfighting requirements in the Operational Requirements Document (ORD) Unmanned Aerial Vehicle - Tactical Control System of 17 January 1997, validated by Joint Requirements Oversight Council Memorandum (JROCM) 011-97 of 3 February 1997. This ORD identified the urgent need to provide a common tactical control system for the current and future family of tactical and MAE UAVs. The program is funded by the Defense Airborne Reconnaissance Office (DARO), which has designated the Navy Program Executive Office Cruise Missiles and Joint Unmanned Aerial Vehicles as the executing agent for the program. The Army, Navy, Air Force, and Marine Corps are participating in the program.

The TCS architecture is also being shared with North Atlantic Treaty Organization (NATO) Army, Navy and Air Force armed services. NATO Project Group (PG) 35 which is led by a U.S. Chairman is leading the joint service integration effort in NATO for application of a UAV TCS. In addition to the work which has been coordinated among members of PG/35 for the last three years, NATO has funded an industrial advisory group to produce the top level standards for the TCS architecture which will be published by NATO.

The TCS program will be implemented in three (3) phases under a compressed schedule. The TCS Program Plan includes incremental builds that add functionality and capability to support multi-UAV control and imagery dissemination. Demonstrations during joint and service specific military exercises, such as Task Force XXI and Joint Warrior Interoperability Demonstrations (JWID), will be conducted on a regular basis to generate early user input and evaluation.

OBJECTIVE

The objective of the UAV TCS project will achieve the following Key Performance Parameters:

- TCS shall be capable of supporting mission planning, mission execution, and data dissemination for Tactical Unmanned Aerial Vehicle (TUAV) and MAE UAV systems and with growth support data collection from HAE UAV.

- TCS shall be interoperable with select Command, Control, Communications, Computers & Intelligence (C^4I) systems in compliance with Assistant Secretary of Defense (ASD) Command, Control, Communications & Intelligence (C^3I) Joint Technical Architecture.

- TCS shall allow operators to have simultaneous flight and payload control of at least two air vehicles, beyond line of sight, using one TCS.

- TCS shall be capable of being interoperable with different types of UAVs and their payloads across the five levels of UAV interaction and with growth to operate multiple platforms/payloads simultaneously as outlined in Figure 1.

    - Level 1 - Dissemination of secondary imagery data;

    - Level 2 - Direct receipt of imagery data, dissemination;

    - Level 3 - UAV payload control, direct receipt of imagery/data, dissemination;

    - Level 4 - Control and payload less launch and recovery, direct receipt of imagery data, dissemination;

    - Level 5 - Full function and control of the UAV from takeoff to landing and dissemination.

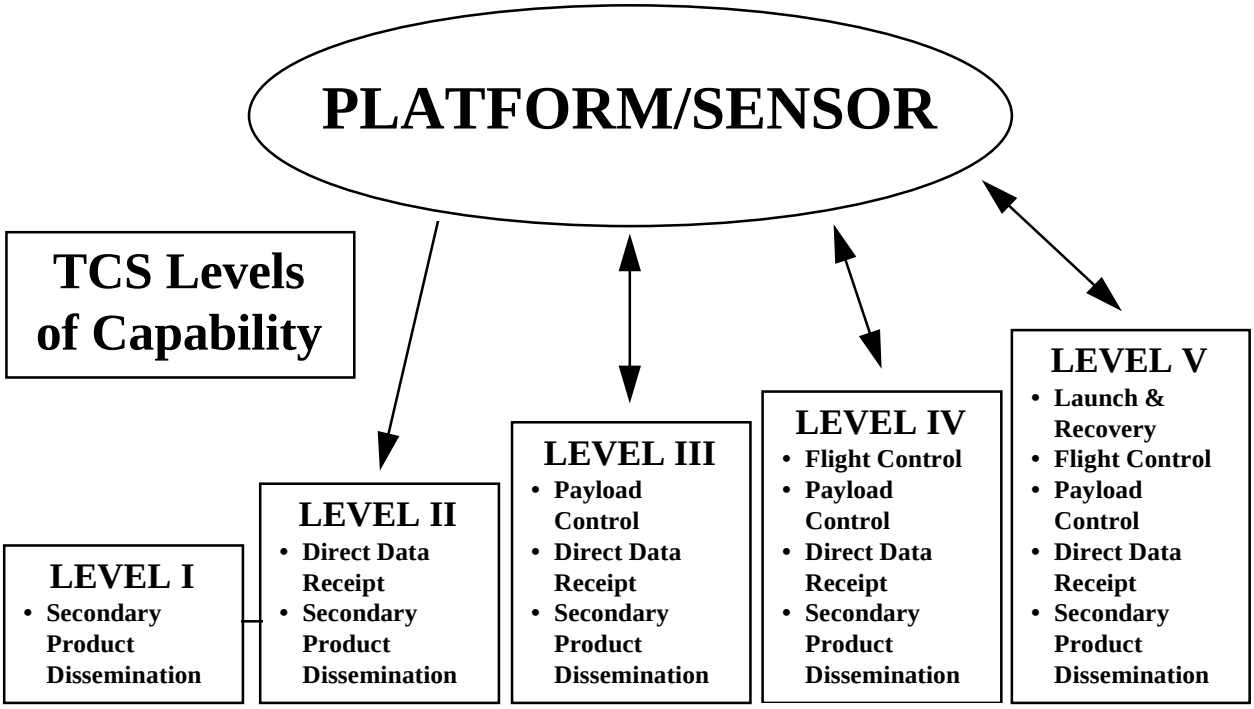

Figure 1. LEVELS OF UAV INTERACTION

Program Schedule and Phases.

The integration effort will be a continuous activity, managed in three separate and sequential phases as outlined in Figure 2.

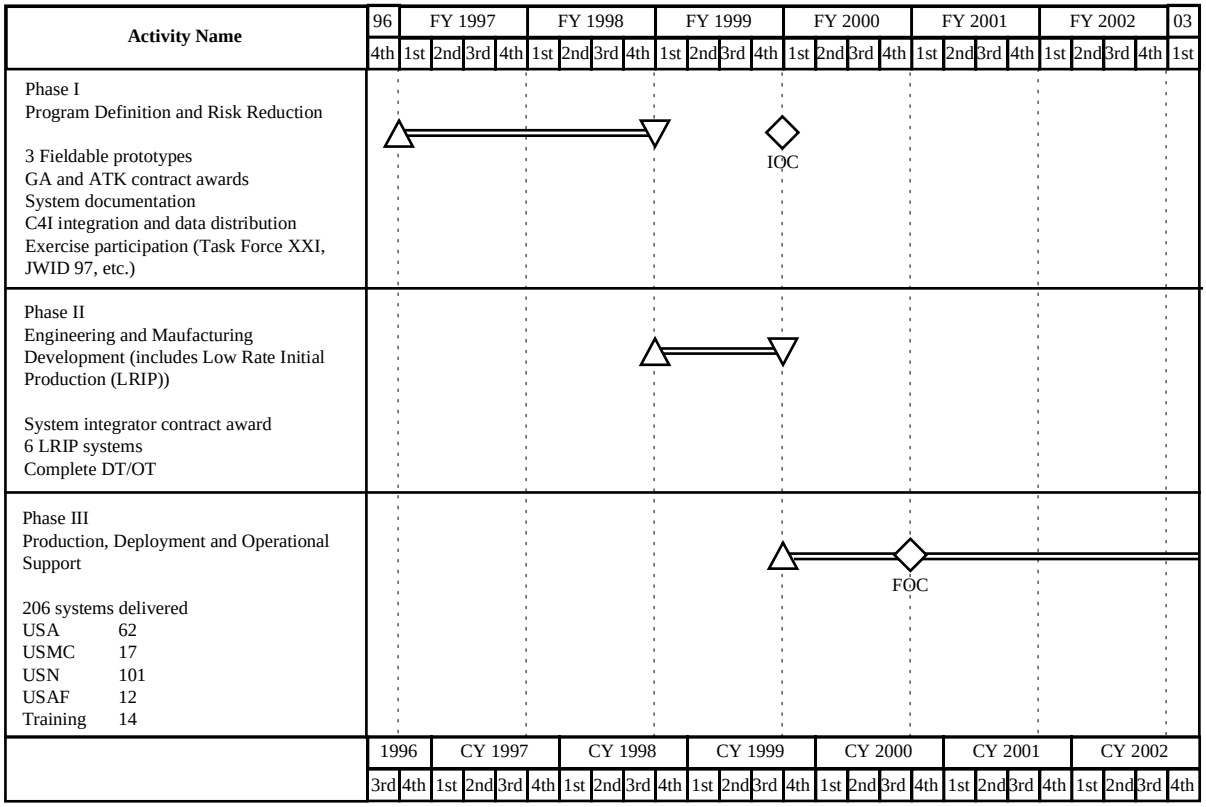

Figure 2. PROGRAM SCHEDULE AND PHASES

Phase I - Program Definition and Risk Reduction.

Phase I began in October 1996. The following figure shows the sequence of events for the program definition and risk reduction.

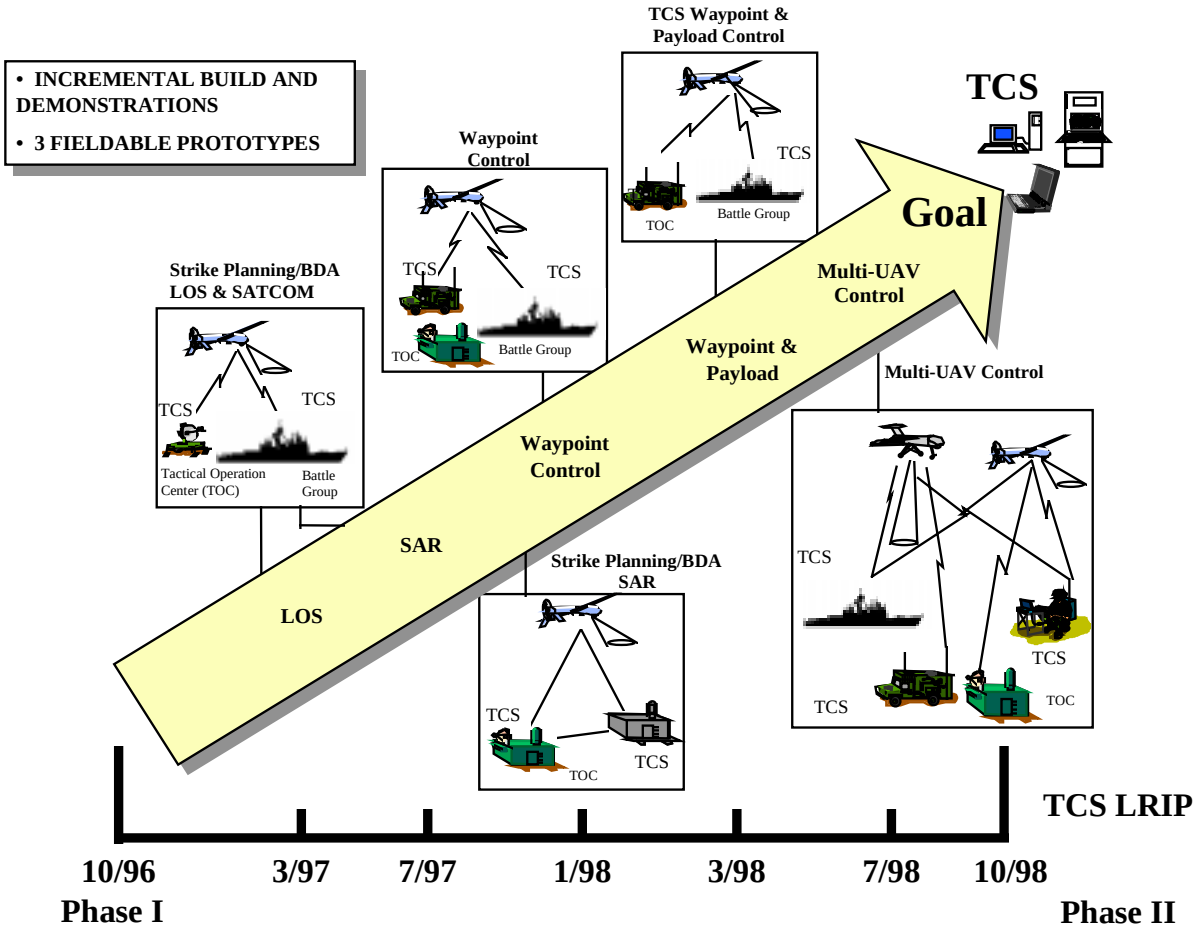

Figure 3. TCS PHASE 1 - PROGRAM DEFINITION AND RISK REDUCTION

Phase I Objectives:

Phase I objectives include:

- Demonstrate the ability of the TCS prototypes to execute the functionality levels defined in the ORD during a build, test, build development approach to support risk reduction and program definition. The basic TCS functions include:

- TCS receipt and dissemination of Predator and Outrider UAV payload video/telemetry data via Line of Sight to C^4I systems
- TCS receipt and dissemination of Predator UAV synthetic aperture radar (SAR) payload information
- TCS waypoint control of the UAV
- TCS waypoint and payload control
- TCS control of multiple types of UAVs (Predator and Outrider) and their payloads

- Document design and interface standards.

- Develop a Joint Concept of Operations (CONOPS) for TCS, which addresses the operational concepts of all services, with various TCS configurations, and installations (1 Army, 1 Navy, 1 Marine)

- Provide three (3) fieldable TCS prototypes to operational units.

- Execute one (1) Cost Plus Fixed Fee (CPFF) contract each with General Atomics (Predator) and Alliant TechSystems (Outrider). The contract will be for the unique hardware components and software modules, simulation support, technical/operations support and maintenance and spares. The contracts will provide for integration, checkout, test and demonstration of the Predator and Outrider system airborne elements with the TCS for concept exploration.

Phase II - Engineering and Manufacturing Development (includes Low Rate Initial Production (LRIP)

Phase II is planned to commence in October 1998.

Phase II Objectives

The objective of Phase II will be to produce six (6) LRIP systems starting 10/98 culminating with an Initial Operational Capability in fourth quarter FY99. These systems will be provided as follows:

- 2 Army
- 2 Navy
- 1 Marine
- 1 Air Force

The systems will be used to conduct development and operational testing (DT/OT) for all services. These TCS systems will be installed in either High Mobility Multipurpose Wheeled

Vehicles (HMMWVs), in tactical operations centers for the Army and Marines and/or on multiple class ships for the Navy. In preparation for this phase a system integration contract will be awarded in FY98. This contractor will be responsible for production and integration of the LRIP systems in the HMMWV, Technical Operations Center (TOC), and ships. Included in this system integration contract will be the continuing integration of TCS with C^4I systems. The contractor will become a member of the TCS government /industry team. This contract will contain a production option which will allow for continuing into Phase III of the program.

Phase III - Production, Deployment and Operational Support

Phase III will commence following the successful conclusion of Phase II.

Phase III Objectives

The objective of Phase III of the program will be to produce the 206 TCS nodes (as depicted in Table 1) identified in the operational Requirements Document. This Phase will begin in FY2000 and final Operational Capability will be established in fourth quarter FY2000.

BACKFIT/FORWARD FIT			**NEW BUYS**	
Outrider	USA	38	USA	24
	USMC	11	USMC	6
	USN	15	USN	86
	Training	4	Training	10
Predator	USAF	10	USAF	2
	TOTAL	78	TOTAL	128

Table 1. BACKFIT/FORWARD FIT AND BUYS

For systems that have already been purchased, a backfit Engineering Change Proposal (ECP) will be developed which makes their ground control system TCS compliant. For these backfit ECPs TCS will provide the software and hardware necessary to obtain a TCS compliant system. Forward fit ECPs will be developed for the new TCS nodes. The system integrator from Phase II will be responsible for implementing each backfit and forward fit ECP. In addition, the contractor shall be responsible for other requirements within the services for Command Centers, HMMWVs, TOCs, Ships, and any other sites to be identified.

Configuration Management

Configuration Management (CM) maintains product control and integrity throughout the project life cycle. This involves identifying the configuration of the software and hardware at any given point in time, systematically controlling changes to the configuration, and maintaining the integrity and traceability of the configuration throughout the life cycle.

TCS CM is being performed according to policies and procedures documented in the NAVAIR Instruction 4130.1C, Configuration Management Manual and Strike Systems Software Configuration Management Plan (T-MGN-0474-00 dated Nov 96), and the TCS Configuration Management Plan (dated Nov 96).

Test and Demonstration Program

During Phase I, a Test and Evaluation Master Plan (TEMP) will be developed. In addition, there will be a UAV TCS Test Plan defining laboratory testing and demonstration of fieldable prototypes. The TCS will require system testing for both the software/hardware and at the battleforce level (communications and operations with command needs at different echelons for the services). The TCS program will also develop a system integration and test capability (to include hardware-in-the-loop and system simulation) to support TCS development, integration, and test activities.

Iterative test activities will be performed to support the incremental build process employed for system development. With each new build, TCS element, segment, and system testing will be performed prior to system flight or demonstration. Software unit, component, configuration item, software integration, and hardware-software integration testing will be performed at the software development facility. In the Joint Technology Center/System Integration Laboratory (JTC/SIL), formal element, segment, and system testing will be performed to validate subsystem interface communications and verify system performance prior to flight testing . JTC/SIL testing will include both simulation-in-the-loop and hardware-in-the-loop tests and will support TCS development and testing throughout its life cycle.

Test Plans will be developed for ground-based integration tests, ground-based flight tests, sea-based integration tests, and sea-based flight tests. Follow-on Operational Test and Evaluation (FOT&E) will be conducted by the warfighters to evaluate training, logistics, supportability, and operational utility of the UAV TCS.

- Land-Based Testing. Land-based testing will consist of natural and induced environments. New designs and hardware components/subsystems will be tested to ensure compliance to specification. An all up Land Based Systems Integration Test (LBSIT) will be conducted on the final UAV TCS.

- Land-Based Flight Validation Test. Flight testing will include a matrix of minimum flights versus objectives required to demonstrate specification compliance.

- Ship-Based System Integration Test. Ship-based system integration testing will be conducted to ensure that the system has been installed properly and will operate in the shipboard environment. These tests will consist of system test and E^3 tests to ensure shipboard compatibility of the system. These activities will lead to an operational demonstration during sea trials prior to the DT/OT phases.

- Ship-Based Flight Validation Test. The ship-based flight testing will be conducted to ensure the UAV TCS system will perform to specification during flight operations, operate within shipboard environments, and is compatible with normal shipboard operations.

Advanced Warfighting Experiments (AWE)

These experiments are designed to provide unit commanders at various echelons with a realistic UAV capability during joint exercises and war games. Output and data collection from these experiments drive both requirements analysis and TCS prototype development. The list of scheduled exercises is expected to increase during the course of Phase I. Demonstrations will be closely tied to scheduled AWEs. AWEs are those joint distributed exercises and advanced concept demonstrations which incorporate simulated UAV capability through use of the Multiple UAV Simulation Environment (MUSE). The MUSE is sponsored by the TCS Program Office with funding support from the DARO, and is developed and managed by the JTC/SIL. Support to these exercises provides opportunities to generate, refine and validate requirements for air vehicles, payloads, and tactical control systems, under realistic conditions. User requirements have been, and continue to be, captured in detail and are fed directly into the TCS development process through a formalized data collection effort. Types of information range from human-computer interface issues to identification of information choke points that impact sensor-to-shooter and sensor-to-sensor timelines. At the same time, UAV capabilities provided during exercises will allow commanders to update operational warfighting tactics and doctrine based on the inclusion of realistic UAV-generated intelligence.

International Demonstrations

The TCS architecture is also planned to be demonstrated in NATO countries during Phase I and II. Planning is continuing for a TCS demonstration to include reception of data from a German Vertical Takeoff & Landing (VTOL) UAV as well as a U.S. VTOL UAV. The planned demonstrations are expected to also include the operation of a TCS in the UK with a live or simulated UAV system. The real goal of the series of NATO tests and demonstrations is to establish sufficient levels of standards to allow the NATO members to nationally contract for systems independently from their own equipment manufacturers. These systems would be compatible with selected UAV systems and interoperable with TCS units being procured in the U.S.

TCS Nodes

The Tactical Control System will provide command, control, communications, data receipt and data dissemination with multiple types of UAVs. For the initial phases of the program the Predator and Outrider will be the primary air vehicles. Data receipt from Global Hawk and Dark Star demonstrations will be included during the TCS development. The TCS will be an interoperable and scalable set of hardware and software for this functionality. TCS will comply

will the following joint architecture doctrines:

- Technical Architecture Framework for Information Management (TAFIM)
- Joint Reconnaissance Information Technical Architecture (JRITA)
- Common Imagery Ground/Surface System (CIG/SS) Acquisition Standards
- Defense Information Infrastructure (DII) Common Operating Environment (COE) Baseline Specification

To provide flexibility of application the TCS will be modular such that the Army, Navy, Marines, and Air Force are able to define the functionality required at each TCS site. The TCS architecture, both hardware and software, provides for UAV unique applications within the design. Each UAV manufacturer will provide their unique air vehicle control loop hardware and software. TCS will provide an interface standard to the air vehicle manufacturers to ensure their unique applications are interoperable and compliant with the TCS architecture. The core TCS software will be able to operate through this interface with multiple types of air vehicles. To reduce life cycle costs the TCS will be designed such that the software can be ported to existing service computer equipment standards, Army - Sun/SPARC, Navy - TAC-4/HP, Marine - Sun/SPARC/HP, Air Force - DEC/SGI. A primary objective for TCS is to disseminate the UAV payload data to the service C^4I systems. TCS is required to provide this data in the correct protocol such that the C^4I system is not required to change to receive this information. Table 2 below shows the TCS hardware and software configurations for each of the services. TCS will be modular such that the users can define the most effective and affordable production installation package.

a. A fully equipped TCS system including all hardware, software, and supporting equipment
b. Use of equipment in the field or on a ship with TCS software running on existing service computing equipment standards (Army-Sun/SPARC; Navy-TAC-4/HP; Marine-Sun/SPARC/HP; Air Force-DEC/SGI)
c. Integration of the TCS software into an existing system to provide an integrated TCS functionality.

Once the services identify the type of installation required at each node, installation unique engineering change proposals will be developed for each of the installations during Phase II and III of the program.

	ARMY/MARINES	**NAVY**	**AIR FORCE**
Hardware	SPARC 20s	TAC 4s	SGI/DECs
Software	Common Core AV Unique Payload Unique	Same	Same
Data Links	LOS/SATCOM Analog/Digital	Same	Same
C^4I Interfaces	ADOCS TBMCS AFATDS MIES ASAS ETRAC IAS/TEG ATHS JSTARS/GSM/CGS Guardrail ACS/IPF JDISS	JSIPS-N/PTW ATWCS JMCIS JDISS CCTV	TROJAN SPIRIT II CARS JSIPS JDISS

Table 2. TCS DELIVERABLES

DEPLOYMENT CONCEPT

All services will employ TCS. TCS will be operated from fixed and mobile land based units and from ships. The TCS will allow interaction from each of these locations. A tactical UAV launched with a TCS from an Amphibious Assault Ship (LHA) could be passed to control of a Marine Corps Expeditionary Unit ashore and in the same mission forwarded gain to an Army Special Forces unit in the same operation. While only one unit will have control of the UAV at one time, the TCS will allow for the reception of payload data either directly from a UAV within line of sight or through one of the C^4 interfaces on the TCS. In this case the unit controlling the UAV will use the C^4 interface to transmit the secondary dissemination data and the remaining TCS units will access the UAV data from an interface with the C^4 node. The Tactical Control System, Figure 4, displays the concept.

TCS will be operated much like current UAV control stations. The operator will control the UAV from the TCS console and the TCS will be integrated with a data link for communication with the UAV. The ability for the operator in the field to disseminate secondary data will be much more robust than any current UAV control system. TCS will be operated from units that currently operate UAVs or host UAV systems. The number of TCS systems will provide for redundancy in the battlefield in the event of the loss of one or more TCS units.

The commonality of the displays, and functions of the TCS will allow operators to control UAVs and disseminate data from TCS installations when operating from units in each of the armed services. Provision for a single bay TCS operator station will reduce the manpower required in the field for the operation of UAV systems and allow the UAVs to be operated from more locations on the battlefield.

Units operating TCS will be able to process all UAV payload data. TCS is not designed for storage of large amounts of payload data or for high level manipulation of imagery data similar to the control system planned for the High Altitude Endurance (HAE) UAV. For these reasons the TCS systems will be able to downlink the HAE UAV data but not for full control of the systems.

Lead CINC/User Sponsors

United States Atlantic Command (USACOM) has been designated by the Joint Staff as lead Commander in Chief (CINC) for the TCS program. USACOM will provide oversight and direction for Warfighter involvement with the TCS program, ensure Joint Force Integration, lead Joint CONOPS Working Group, lead TCS Warfighter Planning Group, determine the command and control for deployment and employment and serve as Executive Oversight/Steering Council co-chair.

USACOM will lead the TCS employment strategies development that should be applied across the full spectrum of military operations (target acquisition, reconnaissance, etc.). This includes: making recommendations for including TCS into the Department of Defense (DoD) structure, supporting the Joint Requirements Oversight Council (JROC) on TCS development and oversight of follow-on acquisition phase, and defining requirements for TCS dissemination to the

Joint Task Force/Joint Force Commander (JTF/JFC).

USACOM will lead the Joint CONOPS Working Group, develop strawman Joint CONOPS, involve component, CINCS, and other potential warfighters. USACOM will also lead the Warfighter Planning Group which will:

- establish Joint CONOPS objectives and tasks
- determine military utility
- make force structure recommendations
- refine joint operational requirements
- plan and direct operational demonstrations and exercises
- develop a Force Implementation/Integration Plan

Concerning potential follow-on TCS operations, USACOM will be responsible for maintenance, training and operational employment support requirements; lead the development of a multi-service training program, in coordination with other CINCs and Services; lead the effort to develop appropriate level TCS organizational structure and manpower analysis for the TCS program; and coordinate with the Services to identify and provide manning resources for whatever TCS systems are fielded.

Finally, USACOM will ensure that the TCS program maintains a Joint Service applicability. USACOM will provide the opportunity for all Services and Theater CINCs to judge the TCSs military utility. Additionally, USACOM will evaluate and report on the TCSs military utility at the demonstration phase conclusion. This evaluation will be based on criteria developed by USACOM in conjunction with the other services and CINCs.

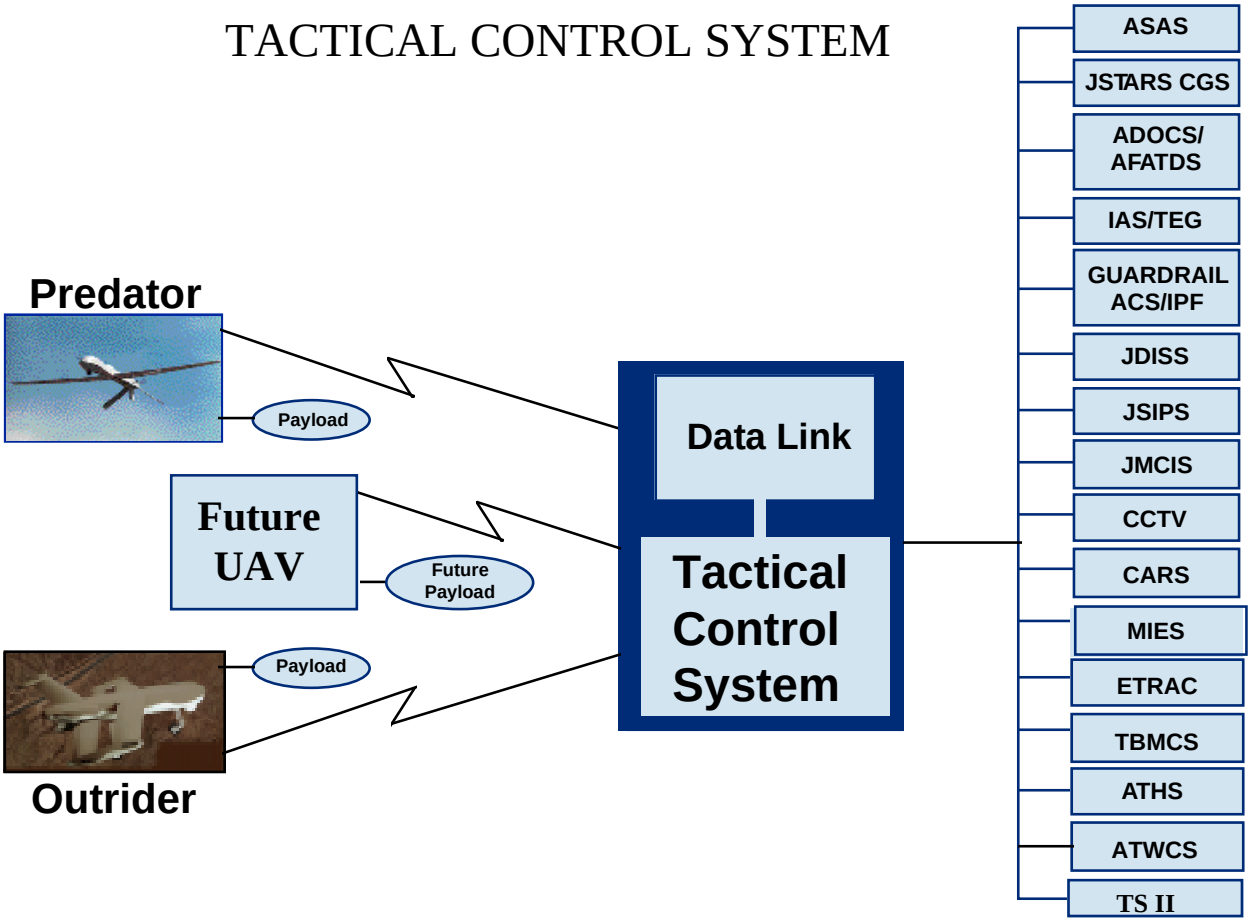

Figure 4. TACTICAL CONTROL SYSTEM

MANAGEMENT

The major UAV TCS project support organizations and primary roles and responsibilities are listed below.

DARO - The DARO is providing funding and oversight to the TCS program at the Office of Secretary of Defense (OSD) level.

Program Executive Officer, Cruise Missiles Project and Joint Unmanned Aerial Vehicles Project (PEO (CU)) Tactical Control System (TCS) The PEO(CU) has been designated by DARO as the executing agent for the TCS Program and will provide program management for TCS. The Milestone Decision Authority for the program will be determined by Under Secretary of Defense (Acquisition and Technology) (USD (A&T)). The Program Manager (PM) is responsible for:

- planning, coordination, and direction of all development community activities related to the program through all phases, including the training at all levels associated with Joint Concept of Operations (CONOPS), field operations and maintenance to include programmatic and technical support to USACOM

TCS Program Office The TCS Program Office is responsible for the following activities within the TCS program:

- acquisition and programmatic management
- system engineering management
- test and evaluation management
- configuration management
- software management
- logistic management
- overarching Integrated Product team management
- datalink integration activities

Government Laboratories The government laboratories are made up of Naval Surface Warfare Center-Dahlgren Division (NSWCDD), Joint Technology Center/System Integration Laboratory (JTC/SIL), and Naval Air Warfare Center (NAWC) - These laboratories are responsible for the following activities within the TCS Program:

- Acquisition and programmatic support to Joint Project Office (JPO)
- Requirements analysis and software development process
- System and software engineering
- TCS architecture development
- TCS software development, upgrades, and integration

- System integration
- Service integration
- C^4I interoperability planning and execution of tests and demonstrations
- Simulation engineering
- Planning and execution of tests and demonstrations
- Planning and execution of TCS Advanced Warfighting Experiment (AWE)
- programmatic and technical support to USACOM

Alliant TechSystems - Alliant TechSystems is under sole-source contract to the JPO to provide Outrider support to TCS development and demonstrations. Support to TCS development will focus on:

- development of Outrider Air Vehicle Real-Time Processor (AV RTP) interface to the TCS Core, Launch and Recovery requirements definition, integration of Outrider-specific hardware with TCS, and Outrider software development to support the Outrider-TCS interface
- demonstration support will include support to TCS System Testing and Simulation, integration, installation, and flight demonstrations using the Outrider UAV

General Atomics (GA) - General Atomics is under sole-source contract to the JPO to provide Predator support to TCS development and demonstrations. Support to TCS development will focus on:

- development of the Predator software and hardware elements TCS Core Software and Hardware
- demonstration support will include support to TCS System Testing and Simulation, integration, installation, and flight demonstrations using the Predator UAV
- providing systems to support TCS development at NSWCDD and JTC/SIL

C^4I Program Offices and Contractors -

- Support development of C^4I interface requirements
- Support integration of TCS & C^4I system
- Support test and demonstration

Other Contractors - Throughout the life cycle of the program other contractors and sub-contractors may be required as the program transitions from phase to phase.

INTEGRATED PRODUCT TEAMS

The TCS will be designed and developed by an industry/government team. Integrated Product Teams (IPTs) have been established to address TCS development and fielding requirements. These industry/government teams consist of representatives (see Figure 5) from the TCS PM, fleet commands, JTC/SIL, NSWCDD, air vehicle manufacturers, C^4I PMs and developers, and other systems commands. IPT size is minimized in order to ensure that groups remain effective. The IPTs shall operate under the following broad principals:

1. Qualified empowered team members
2. Open discussions
3. Consistent, success-oriented, proactive participation
4. Continuous "up-the-line" communications
5. Issues raised and resolved early

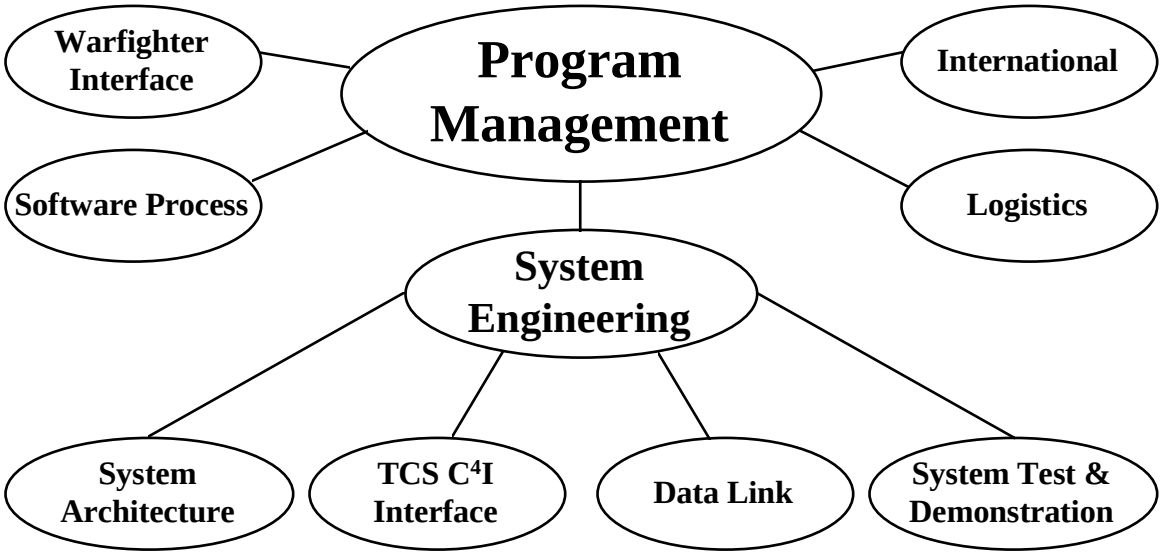

Figure 5. TCS IPTs

KEY SUPPORTING DOCUMENTS

The documents presented below are UAV TCS supporting and program documents:

- TCS Acquisition Plan
- TCS Acquisition Strategy Report
- TCS Configuration Management Plan
- TCS Concept of Operations (CONOPS)
- TCS Submarine Based Predator Control System (SBPCS) Interface Design Description
- TCS Joint Interoperable Interface (JII) I AV-RTP to TCS Core
- TCS Maritime Command Information System (JMCIS) Interface Design Description

- Systems Requirements Document (SRD) for the TCS/UAV
- TCS Data Server Interface Design Description
- TCS Hunter Specific (HS) Formal Qualification Testing (FQT) Software Test Plan
- TCS Software Requirements Specification
- Operational Requirements Document (ORD) for the UAV TCS
- Joint Interoperability Interface (JII) for the TCS Real Time Function (RTF) to Air Vehicle (AV)
- Integration and Test Program Plan for the UAVTCS
- TCS-M Level Test Plan
- TCS Tactical Communication Application Programming Interface
- TCS Tactical Communication Build Plan
- UAV International Technology Demonstration Program (ITDP)
- UAV TCS Test and Evaluation Master Plan (TEMP)
- UAV TCS Human-Computer Interface (HCI) Design Approach
- TCS Work Breakdown Structure (WBS) Data Dictionary
- TCS Integrated Logistic Support Plan (ILSP)

Appendix 1 - Acronym List

A&T	Acquisition and Technology
ACS	Aerial Common Sensor
ADOC	Army Defense Operations Coordination System
AFATDS	Advanced Field Artillery Tactical Data System
ASAS	All Source Analysis System
ASD	Assistant Secretary of Defense
ATHS	Automatic Target Hand-off System
ATK	Alliant TechSystems
ATWCS	Advanced Tomahawk Weapon Control System
AV	Air Vehicle
BDA	Battle Damage Assessment
C^3I	Command, Control, Communications & Intelligence
AWE	Advanced Warfighting Experiment
C^4I	Command, Control, Communications, Computers & Intelligence
CARS	Contingency Airborne Reconnaissance System
CCTV	Closed Circuit TeleVision
CG	Guided Missile Cruiser
CGS	Common Ground Station
CIG/SS	Common Imagery Ground/Surface System
CINC	Commander in Chief
CM	Configuration Management
COE	Common Operating Environment
CONOPS	Concept of Operations
CPFF	Cost Plus Fixed Fee
DARO	Defense Airborne Reconnaissance Office
DII	Defense Information Infrastructure
DDG	Guided Missile Destroyer
DoD	Department of Defense
DT/OT	Development Test/Operational Test
ETRAC	Enhanced Tactical Radar Coordinator
FLOT	Forward Line of Own Troops
FOC	Full Operational Capability
FOL	Forward Operating Location
FOT&E	Follow On Test & Evaluation
GA	General Atomics
GSM	Ground Station Module
HAE	High Altitude Endurance
HCI	Human Computer Interface
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HP	Hewlett Packard
IAS/TEG	Intelligence Analysis System/Tactical Exploitation Group
ILSP	Integrated Logistics Support Plan
IOC	Initial Operational Capability

IPF	Integrated Processing Facility
IPT	Integrated Product Team
JDISS	Joint Deployable Intelligence Support System
JII	Joint Interoperability Interface
JMCIS	Joint Maritime Command Information System
JPO	Joint Project Office
JROC	Joint Requirements Oversight Council
JROCM	Joint Requirements Oversight Council Memorandum
JSIPS	Joint Service Imagery Processing System
JSTARS-GSM	Joint Surveillance Target Attack Radar System-Ground Station Module
JTC/SIL	Joint Technology Center/System Integration Laboratory
JTF/JFC	Joint Task Force/Joint Force Commander
JWID	Joint Warier Interoperability Demonstrations
LBSIT	Land Based Systems Integration Test
LOS	Line of Sight
LHA	Amphibious Assault Ship
LRIP	Low Rate Initial Production
MAE	Medium Altitude Endurance
MIES	Modernized Imagery Exploitation System
MUSE	Multiple UAV Simulation Environment
NATO	North Atlantic Treaty Organization
NAWC	Naval Air Warfare Center
NCA	National Command Authority
NSWCDD	Naval Surface Warfare Center Dahlgren Division
ORD	Operational Requirements Document
OSD	Office of Secretary of Defense
OSDP	Open System Deployment Plan
PG	Project Group
PEO (CU)	Program Executive Officer for Cruise Missiles and UAVs
PM	Program Manager
RTP	Real Time Processor
SAR	Synthetic Aperture Radar
SATCOM	Satellite Communications
SBPCS	Ship-board Predator Control Station
SGI	Silicon Graphics Inc.
SOF	Special Operations Force
SRD	Systems Requirements Document
TAC	Tactical Advanced Computer
TAFIM	Technical Architecture Framework for Information Management
TBMCS	Theater Battle Management Core System
TCS	Tactical Control System
TEMP	Test and Evaluation Master Plan
TOC	Technical Operations Center
TS II	Trojan Spirit II

TUAV	Tactical Unmanned Aerial Vehicle
UAV	Unmanned Aerial Vehicle
USA	United States of America
USACOM	United States Atlantic Command
USAF	United States Air Force
USD	Under Secretary of Defense
USMC	United States Marine Corp
USN	United States Navy
VTOL	Vertical Takeoff & Landing